Previous class

- Designing heuristic functions: \( h(n) \)
  - dominance
  - consistency

- Iterative deepening A* search
  (it is really an iterative depth-first search
  with \( f(n) \) as a limit rather than depth)
  \[ f(n) = g(n) + h(n) \]

Today

- Constraint satisfaction problems

  \[ f^*(G) \] G: optimal goal

  \[ \text{here if admissible} \]

CASTING SUDOKU AS A SEARCH PROBLEM

state:
actions:
goal test: all cells are filled with valid values
values that satisfy the constraints

\[ \text{SAT}: \left( \bigwedge_{i=1}^{n} a_i \right) \text{ s.t. } \left( \bigwedge_{i=1}^{n} \bigwedge_{j=1}^{m} (v_{ij} \mid \text{valid}) \right) \]

1 2 3
4 5 6
7 8 9
CSP: \( v_1, v_2, \ldots, v_n \)

\( \{1, 2, 3, \ldots, 9\} \)

<table>
<thead>
<tr>
<th>assigned</th>
<th>non-assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>( v_1, \ldots, v_n )</td>
<td></td>
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pick a variable \( v_i \)

\( v_1 = 1, v_2, \ldots, v_n \)

\( v_2 = v_2, \ldots \)

which one \( \text{DFS} \) why?

better space complexity unless there is a

\( \text{BFS} \)

notion of optimality

level \( n \)

What is the depth of the solution? \( d = n \)

The solution will be there